5 PALEONTOLOGY

Paleontological resources include ancient plant and animals whose hard tissues have been preserved in geological strata. Fossils of Pleistocene and Miocene age, including large mammals such as the mammoth and mastodon, are found in the Livermore area. This analysis was based on consultation with LLNL staff and press releases.

Paleontological Resources

- 1992 EIS/EIR: The EIS/EIR identified known paleontological resources, addressed potential impacts, and identified mitigation measures for prehistoric and cultural resources that could be applied to paleontological resources if needed.
- 1992–1997: Excavation for the NIF unearthed mammoth and horse fossils. Those fossils that would be affected by construction were excavated and curated at the UC Museum of Paleontology at Berkeley.
- 1998–2002: New and proposed projects may result in additional fossil finds. These resources would be managed according to the mitigation measures identified in the 1992 EIS/EIR. Supplementation of the EIS/EIR for paleontological resources is not needed.

5.1 THE 1992 EIS/EIR ASSESSMENT

The 1992 EIS/EIR (DOE 1992) identified the presence of paleontological resources at Site 300, including vertebrate fossils of mastodon, early horses, and canines of Miocene age. Invertebrate and plant fossils from the Neroly Formation were also found at Site 300. No paleontological resources were known to be present at the Livermore site, although fossil remains of several Pleistocene-age mammals had been found in the surrounding hills of the eastern Livermore Valley. The EIS/EIR concluded that none of the proposed action activities were near or on any fossil beds at either the Livermore site or Site 300. Mitigation measures were established, however, in case any prehistoric or cultural resources were identified; these same mitigation measures would be followed if paleontological resources were found during project activities.

5.2 CHANGES FROM 1992 TO 1997

In 1997, mitigation measures were implemented when paleontological resources dating to the late Pleistocene age were found in the northeastern quadrant of the Livermore site during construction of the NIF. Materials found included the fossil remains of two mammoths and two horses in close proximity. The fossils were located at depths of approximately 20 to 35 ft below the ground surface in an unnamed valley fill deposit that lies directly above the Livermore Formation.

One locale contained the partial skeleton of a mammoth (*Mammuthus columbi*), including a portion of the skull, teeth, ribs, vertebrae, humerus, and tusk; and a second locale contained a partial pelvis (innominate bone) of a horse (likely *Equus*). Under the provisions of the Antiquities Act of 1906, these materials were excavated under an Antiquities Permit granted to DOE by the U.S. Department of the Interior. While the Smithsonian Institution has the first rights to the materials, the remains are being curated into the collections at the UC Museum of Paleontology at Berkeley.

A fossil at a third locale was also identified as a partial mammoth skeleton, and a fossil at a fourth locale was identified as a partial horse skeleton. The exact locations of the fossils were recorded, but because these sites would not be disturbed by construction activities, the fossils were left in place. A Supplement Analysis (DOE 1997c) was prepared under DOE regulations implementing NEPA (10 CFR 1021.314) to evaluate the potential adverse impacts of excavating the skeletal remains. The excavation and preservation of paleontological resources discussed in the referenced SA can be considered general ongoing activities that would occur throughout the Livermore site, regardless of the project location or program affiliation of the element that unearthed the find. The 1992 EIS/EIR discusses the potential for impacts to cultural and prehistoric resources and outlines mitigation measures, which were implemented in 1997 to avoid adverse impacts.

5.3 ANALYSIS OF PROJECTED CHANGES FROM 1998 TO 2002

Since the fossil remains discovered during NIF construction were at depths of 20 to 35 ft in a valley fill deposit, it is unlikely that any of the other key projects at the Livermore site listed in Table 1.1 would uncover comparable paleontological materials. None of these projects involves excavation to the depths comparable to NIF. However, proposed or modified projects at Site 300 might uncover paleontological materials at that site.

Future finds of fossils at the Livermore site or Site 300 would be handled under existing procedures, and the mitigation measures outlined in the 1992 EIS/EIR would be applied. Although more is now known about the distributions and types of fossils that might be found during project activities, the potential impacts and applicable mitigation measures remain the same as summarized in the 1992 EIS/EIR, augmented by additional project-specific mitigation measures, if necessary.

5.4 CONCLUSIONS

New and proposed projects may result in additional fossil finds. These resources would be managed according to the mitigation measures identified in the 1992 EIS/EIR. No further supplementation of the EIS/EIR with respect to paleontological resources is considered necessary.